

CLAIMS

What is claimed is:

1. A method of removing oxides of sulfur from an exhaust gas stream, comprising
5 wetting at least a portion of the exhaust gas steam in order that the oxides of sulfur are entrapped and/or dissolved in the liquid thereby cleaning the exhaust gas; and further comprising cooling the exhaust gas steam and/or cleaned exhaust gas to condense desired fractions thereof.
- 10 2. A method according to claim 1 wherein particulates and/or other undesirable components are removed from the gas stream.
3. A method according to claim 1 wherein the liquid is or is predominantly water.
- 15 4. A method according to claim 1 wherein the liquid includes a detergent.
5. A method according to claim 4 wherein the detergent constitutes approximately 1 part in 50,000 of the liquid.
- 20 6. A method according to claim 1 wherein the liquid includes antifreeze.
7. A method according to claim 1 wherein the step of passing the gas steam occurs in a container having a splash guard for minimising loss of the liquid from the container.

8. A method according to claim 7 wherein the step of cooling takes place in an outlet for cleaned gas.
- 5 9. A method according to claim 7 wherein the splash guard cools the cleaned gas.
- 10 10. A method according to claim 1 wherein the gas stream flows into the liquid via a submerged pipe having a plurality of apertures defining an aggregate area at least equal to the diameter of the pipe.
11. A method according to claim 1 wherein the exhaust gas steam is blown onto the surface of the liquid.
12. A method according to claim 1 wherein the exhaust steam is from an internal combustion engine.
- 15 13. A method according to claim 12 wherein the exhaust gas is from a compression ignition engine.
- 20 14. A method according to claim 13 wherein the compression ignition engine burns a heavy gasoline fraction.

15. A method according to claim 1 comprising the further step of filtering the liquid to remove particulates therefrom.

16. A method according to claim 12 wherein the engine is located in a vessel craft
5 designed for water transport.

17. A method according to claim 15 including the further step of further passing a gas stream through the filtered liquid.

10 18. An apparatus for removing oxides of sulfur from a gas stream and forming sulfuric acid, comprising a container containing a first liquid; an inlet for the gas stream permitting wetting of at least a portion of the gas stream; and a first outlet from the container for cleaned gas wherein the inlet and/or first outlet includes condensing means for cooling desired fractions of the gas steam, and/or cleaned gas; a second outlet
15 coupled to filter means for removing particulates from the first liquid; heating means to evolve the oxides of sulfur from the first liquid; condenser means to remove water vapour from the evolved oxides of sulfur; reacting means for converting the oxides of sulfur into a form for sulfuric acid formation; and absorbing means for dissolving the converted oxides of sulfur into a second liquid.

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19. An apparatus according to claim 18 wherein the first liquid is or is predominantly water.

20. An apparatus according to claim 18 wherein the first liquid includes a detergent.

21. An apparatus according to claim 20 wherein the detergent constitutes approximately 1 part in 50,000 of the first liquid.

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22. An apparatus according to claim 18 wherein the first liquid includes an antifreeze.

23. An apparatus according to claim 18 including a splash guard for minimising loss of the liquid from the container.

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24. An apparatus according to claim 23 wherein the splash guard includes a perforated plate covering or substantially covering the surface of the liquid.

25. An apparatus according to claim 24 wherein the plate includes plural perforations

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26. An apparatus according to claim 18 including a wire mesh overlying the surface of the first liquid.

27. An apparatus according to claim 26 wherein the wire mesh overlies the perforated plate.

28. An apparatus according to claim 18 wherein the outlet for cleaned gas includes a pipe containing a wire mesh.

29. An apparatus according to claims 18 including a cooler for the outlet for cleaned gas.

5 30. An apparatus according to claim 29 wherein the cooler is or includes one or more cooling pipes surrounding or within the outlet and having flowing therein a cold fluid.

31. An apparatus according to claim 29 wherein the cooler includes a mesh of thermally conducting material in the outlet, for condensing gas in the outlet.

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32. An apparatus according to claim 18 wherein the inlet for the gas stream includes a pipe, connected to a source of the gas stream, at least partially submerged in the liquid and including one or more apertures permitting passage of the gas steam through the liquid.

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33. An apparatus according to claim 18 wherein the inlet for the gas stream includes a pipe arranged such that the gas stream is blown onto the surface of the liquid.

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34. An apparatus according to claim 18 including a filter for filtering of particulates from the liquid.

35. An apparatus according to claim 34 wherein the container includes one or more apertures for filling it with and emptying it of the liquid, thereby permitting use of the filet remotely of the container and return of the filtered liquid to the container.
- 5 36. An apparatus according to claim 18 including a particulate detecting device, operatively connected to monitoring apparatus, in the outlet for cleaned gas.
37. An apparatus according to claim 18 including a filter in the outlet for cleaned gas.
- 10 38. An apparatus according to claim 37 wherein the filter is a ceramic filter.
39. An apparatus according to claim 18 wherein the container is generally hemispherical or spheroidal.
- 15 40. An apparatus according to claim 18 further comprising an ozone generator for providing ozone to the container in order to react with undesirable components of the gas stream to reduce or substantially eliminate said undesirable components from being passed out of the container with the cleaned gas.
- 20 41. An apparatus according to claim 18 wherein the reacting means includes a vanadium pentoxide catalyst.

42. An apparatus according to claim 18 wherein the converted oxides of sulfur comprise substantially sulfur trioxide and the second liquid is sulfuric acid.

43. An apparatus according to claim 18 which additionally comprises diluting means
5 for diluting the second liquid.

44. A vessel craft designed for water transport including the apparatus according to
claim 18.

10 45. The vessel craft according to claim 44, wherein the vessel craft is a ship.

46. The ship according to claim 45, wherein the ship is selected from an ocean-going liner, an oil tanker or a cargo ship.

15 47. A method of producing sulfuric acid comprising:
removing oxides of sulfur from an exhaust gas stream by entrapping and/or
dissolving the oxides of sulfur in a liquid;
evolving the oxides of sulfur from the liquid and converting the evolved oxides of
sulfur into a form for sulfuric acid formation;
20 dissolving the converted oxides of sulfur into sulfuric acid to form oleum and
subsequently diluting the oleum with water to form sulfuric acid.

48. A method according to claim 47 wherein the converted oxides of sulfur comprise substantially sulfur trioxide.

49. A method according to claim 47 wherein the converting step is achieved with a
5 vanadium pentoxide catalyst.